What is claimed is:

1. A pressurized hybrid system for deicing ice covered surface comprising:

a first source of deicing fluid

second source of deicing fluid

first pressurizer coupled to the first source of deicing fluid for supplying a pressurized deicing fluid at velocities in excess of 600 mph.

second pressurizer coupled second source of deicing fluid for supplying a pressurized deicing fluid at velocities in excess of 600 mph.

a dual flow concentric nozzle coupled to said first and second sources of deicing fluid through said first and second pressurizes, said a dual flow nozzle includes two separate passages for combining fluids from said first and second sources as a stream within a stream fluid and

a nozzle control for directing the stream toward an ice covered surface to dislodge accumulated ice from the surface.

2. The pressurized hybrid deicing system of claim 1 wherein the ice covered surface is an aircraft.

3. The pressurized hybrid deicing system of claim 1 wherein the concentric passages of the dual flow nozzle are substantially co-planar at the nozzle exit.

4. The pressurized hybrid deicing system of claim 1 wherein the concentric passages of the dual flow nozzle are substantially concentric about a common center line.

5. The pressurized hybrid deicing system of claim 1 wherein the first source of deicing fluid comprises an entraining fluid selected from the group including air, water and inert gas and the second source of deicing fluid is selected from the group including: glycol (type I), glycol (type I) and glycol diluted with water.

6. The pressurized hybrid deicing system of claim 1 wherein the dual flow nozzle includes a first passage encasing the second passage.

7. The pressurized hybrid deicing system of claim 1 wherein the second passage comprises a thick walled pipe.

8. The pressurized hybrid deicing system of claim 1 further including a third passage encased within the second passage, said third passage being coupled to the glycol supply for supplying a central glycol stream.

9. The pressurized hybrid deicing system of claim 8 wherein the second passage comprises a thin walled pipe.

10. The pressurized hybrid deicing system of claim 8 wherein the three separate passages are concentric a common center line.

11. The pressurized hybrid deicing system of claim 8 wherein the three separate passages converge a the nozzle exit.

12. The pressurized hybrid deicing system of claim 8 wherein the three separate passages are substantially coplanar at the nozzle exit.

13. The pressurized hybrid deicing system of claim 8 wherein glycol flows in the second and third passages and air flows in the first passage.

14. The pressurized hybrid deicing system of claim 5 wherein the glycol and air streams are substantially independent.

15. The pressurized hybrid deicing system of claim 5 wherein the glycol and air streams exit the nozzle at approximately the same velocities and as substantially independent streams.

16. The pressurized hybrid deicing system of claim 1 wherein the second source of deicing fluid is selected from the class comprising glycol (type I), glycol (type I) and glycol diluted with water.

17. The pressurized hybrid deicing system of claim 1 wherein the first deicing fluid is heated.

18. The pressurized hybrid deicing system of claim 1 wherein the second deicing fluid is heated.

19. The pressurized hybrid deicing system of claim 1 wherein the deicing fluid is diluted with water.

20. The pressurized hybrid deicing system of claim 1 wherein the first pressurizer is a centrifugal compressor.

21. The pressurized hybrid deicing system of claim 1 wherein the first pressurizer supplies the pressurized fluid at velocities in excess of 600 ft/sec.

22. The pressurized hybrid deicing system of claim 1 wherein the first pressurizer supplies the pressurized fluid at velocities in the range of 600 to 800 mph.

23. The pressurized hybrid deicing system of claim 1 wherein the second pressurizer comprises a triplex pump.

24. The pressurized hybrid deicing system of claim A wherein second pressurizer provides glycol flows in the range of 6 gpm @ 7000 psi to 20 gpm @ 300 psi.

25. The pressurized hybrid deicing system of claim 1 wherein the systems adapted for usage on a moving vehicle.

26. The pressurized hybrid deicing system of claim 25 wherein vehicle is a truck.

27. The pressurized hybrid deicing system of claim 26 wherein the vehicle includes a boom for mounting.

28. The pressurized hybrid deicing system of claim 1 wherein the a dual flow concentric nozzle long radius nozzle.

29. The pressurized hybrid deicing system of claim 1 wherein the system includes a first controllable valve is coupled between the source of deicing fluid and the nozzle to regulate the flow of deicing between fluid high pressure low/flow mode and low pressure high flow

30. The pressurized hybrid deicing system of claim 1 wherein the second deicing fluid is discharged from the nozzle a central jets stream.

31. The pressurized hybrid deicing system of claim 30 wherein second deicing fluid is encased in a stream of second

32. The pressurized hybrid deicing system of claim 1 wherein nozzle has a 0.060 inch diameter and provides a deicing fluid flow approximately 6 gpm.

33. The pressurized hybrid deicing system of claim 1 wherein nozzle has a carbide tip

34. The pressurized hybrid deicing system of claim 5 the glycol and air are simultaneously supplied

35. The pressurized hybrid deicing system of claim 34 further including a valve for adjusting the flow of the first deicing fluid.

36. The pressurized hybrid deicing system of claim 35 further including a boom and wherein the deicing fluid control valve is mounted on the boom

37. The pressurized hybrid deicing system of claim 1 wherein the coaxial nozzle combines two fluid flow technologies, conversion of subsonic airflow to sonic airflow and high pressure liquid jetting, to produce two compatible and coaxial streams of air and deicing fluid at flow rates of 100 ppm and 6 gpm, respectively.

38. The pressurized hybrid deicing system of claim 1 the two compatible, yet independent, fluid streams exit the coaxial nozzle at equal velocities of 800 mph.

39. The pressurized hybrid deicing system of claim 38 wherein the inner stream of energetic deicing fluid provides the force necessary to break loose frozen snow and ice from aircraft surfaces and to also move heavy, wet snow and the outer sheath of high velocity air then works in concert with this inner stream to hydrodynamically sweep away the ice and snow.

40. The pressurized hybrid deicing system of claim 1 wherein the coaxial nozzle includes an annular exit region formed by a converging/diverging nozzle for discharging the outer airstream exits the nozzle through

41. The pressurized hybrid deicing system of claim 1 wherein the coaxial nozzle includes an inner pipe assembly installed along the centerline of the air nozzle.

42. The pressurized hybrid deicing system of claim 1 wherein the converging/diverging nozzle efficiently accelerates the subsonic airflow to near sonic velocity.

43. The pressurized hybrid deicing system of claim 1 wherein the coaxial nozzle produces two substantially equal, high velocity streams exiting from a common plane and moving in the same direction.

44. The pressurized hybrid deicing system of claim 1 wherein the coaxial nozzle has two smaller pipes, one concentric to the other, along the centerline of the air nozzle wherein a high pressure in the range of 7000 psi of deicing fluid flows through the inner pipe and exits through a 0.060 inch diameter jetting nozzle at 6 gpm.

45. The pressurized hybrid deicing system of claim 44 wherein the exit of this jetting nozzle is coplanar with the exit of the air nozzle which increases the compatibility of these fluid streams,

46. The pressurized hybrid deicing system of claim 45 wherein the two streams exiting the nozzle join with equal velocities.

47. The pressurized hybrid deicing system of claim 5 wherein the outer sheath of high velocity air minimizes dispersion of the inner fluid stream helping to maintain the concentrated momentum of the inner deicing fluid stream

48. The pressurized hybrid deicing system of claim 47 wherein the momentum of this inner stream is concentrated by the special high pressure jetting nozzle into a solid conical jet that is approximately 1 ft. in diameter at the 4 to 6 ft. working distance.

49. The pressurized hybrid deicing system of claim 1 wherein the deicing fluid in the inner stream is heated to 180°F so that the hydrodynamic sweeping action is augmented by thermal removal of ice and snow.

50. The pressurized hybrid deicing system of claim 49 wherein the nozzle includes an annular path between the two inner, concentric pipes for a second deicing fluid stream.

51. The pressurized hybrid deicing system of claim 50 wherein the deicing fluid heated to a temperature of approximately 180°F is supplied to the annular path by an operator

52. The pressurized hybrid deicing system of claim 51 wherein activated remotely controlled valve controls the supply of the heated deicing fluid.

53. The pressurized hybrid deicing system of claim 52 wherein the heated deicing fluid exits the coaxial nozzle at 20 gpm through an annular array of orifices coplanar with the other two nozzles wherein the outer sheath of high velocity air is present in this mode of deicing designed to remove hard, thick ice by the conventional thermal process.

54. The pressurized hybrid deicing system of claim 1 further including remotely controlled valves that allow the operator to select any of three deicing operation modes selected from the class comprising: i) low flow (6 gpm), high velocity deicing fluid for most deicing conditions, ii) high flow (20 gpm), low velocity deicing fluid for hard, thick ice, and iii) high velocity air only for dry snow not adhered to the aircraft surfaces.

55. The pressurized hybrid deicing system of claim 1 wherein further embodiment of hybrid deicing is the use of a gear driven centrifugal compressor having ample discharge pressure and airflow to provide effective hybrid deicing at high altitude airports.

56. The pressurized hybrid deicing system of claim 55 wherein the gear driven compressor is installed at the base of a deicing boom to minimize air handling problems associated with air delivery through large diameter hose and pipe.

57. The pressurized hybrid deicing system of claim 1 wherein the high pressure deicing fluid is supplied by a customized triplex-type positive displacement pump which has sufficient capacity to pump fluid at both low flow of approximately 6 gpm, high pressure of approximately 7000 psi condition and high flow of approximately 20 gpm, low pressure of approximately 300 psi condition.

58. A pressurized hybrid system for deicing aircraft comprising:

a source of glycol based deicing fluid,

a high pressure pump for supplying glycol at velocities in excess of 600 mph.,

a source of pressurized air,

a dual flow nozzle coupled to said supply of pressurized glycol and pressurized air, said a dual flow nozzle includes two separate passages for combining glycol and air as a glycol stream encased within a within an air stream.

59. The pressurized hybrid deicing system of claim 58 wherein the two separate passages converge a the nozzle exit.

60. The pressurized hybrid deicing system of claim 58 wherein the two separate passages are annular.

61. The pressurized hybrid deicing system of claim 58 wherein the two separate passages are concentric a common center line.

62. The pressurized hybrid deicing system of claim 58 wherein the first passage encases the second passage.

63. The pressurized hybrid deicing system of claim 58 further including a third passage encased within the second passage, said third passage being coupled to the glycol supply for supplying .

64. The pressurized hybrid deicing system of claim 63 wherein the three separate passages are concentric a common center line.

65. The pressurized hybrid deicing system of claim 58 wherein the three separate passages converge a the nozzle exit.

66. The pressurized hybrid deicing system of claim 58 wherein the three separate passages are substantially coplanar at the nozzle exit.

67. The pressurized hybrid deicing system of claim 63 wherein glycol flows in the second and third passage and air flows in the first passage.

68. The pressurized hybrid deicing system of claim 58 wherein the glycol and air streams are substantially independent

69. The pressurized hybrid deicing system of claim 58 wherein the glycol and air streams are traveling at approximately the same velocities exiting the nozzle are substantially independent

70. The pressurized hybrid deicing system of claim 58 further including nozzle control for directing the deicing stream toward an ice covered surface to dislodge accumulated ice from the surface.

71` A Method for deicing an ice covered surface comprising

providing a first source of deicing fluid

providing second source of deicing fluid

pressurizing the first source of deicing fluid for supplying a pressurized deicing fluid at velocities in excess of 600 ft/sec.

pressurizing the second source of deicing fluid for supplying a pressurized deicing fluid at velocities in excess of 600 ft/sec.

coupling a nozzle to said first and second sources of pressurized deicing fluid for combining fluids from said first and second sources as a stream within a stream

72. The method for deicing of claim 71 further including the step of directing the stream within a stream toward an ice covered surface to dislodge accumulated ice.

73. The method for deicing of claim 71 wherein the nozzle comprises a dual flow nozzle having passages that are substantially co-planar at the nozzle exit.

74. The method for deicing of claim 71 wherein the passages of the dual flow nozzle are substantially concentric about a common center line.

75. The method for deicing of claim 71 wherein the nozzle comprises three separate passages are substantially coplanar at the nozzle exit.

76. The method for deicing of claim 71 wherein glycol flows in the second and third passages and air flows in the first passage.

77. The method for deicing of claim 71 wherein the glycol and air streams are substantially independent.

78. The method for deicing of claim 77 wherein the glycol and air streams exit the nozzle at approximately the same velocities and as substantially independent streams.

79. The method for deicing of claim 71 wherein the step of pressurizing the first source of deicing fluid for supplies the pressurized fluid at nozzles velocities in the range of 600 to 800 mph.

80. The method for deicing of claim 71 wherein the step of pressurizing the first source of deicing fluid for supplies the pressurized fluid at nozzles velocities in the range of 600 to 800 mph.

81. The method for deicing of claim 71 wherein the step of pressurizing the first source of deicing fluid provides glycol flows in the range of 6 gpm @ 7000 psi to 20 gpm @ 300.

82. The method for deicing of claim 71 further including the step of controlling the flow of deicing fluid to the nozzle to regulate the flow of deicing between fluid high pressure low/flow mode and low pressure high flow mode.

83. The method for deicing of claim 71 further including the step of supplying a stream of energetic deicing fluid with a force necessary to break loose frozen snow and ice from iced surfaces and to also move heavy, wet snow and outer sheath of high velocity air to work in concert with this inner stream to hydrodynamically sweep away the ice and snow.

84. The method for deicing of claim 71 further including the step of efficiently accelerating a subsonic airflow to sonic velocity.

85. The method for deicing of claim 71 further including the step of applying an outer sheath of high velocity air to maintain the concentrated momentum of the inner deicing fluid stream

86. The method for deicing of claim 71 further including the step of concentrating the deicing fluid into a solid conical jet that is approximately 1 ft. in diameter at the 4 to 6 ft. working distance.

87. The method for deicing of claim 71 further including the step of heating the deicing fluid in the range of 180°F so that the hydrodynamic sweeping action is augmented by thermal removal of ice and snow.

88. The method for deicing of claim 71 further including the step of continuously cycling the deicing fluid to maintain heat fluid ready for discharge.

89. The method for deicing of claim 71 further including the step of abruptly turning controlling change from glycol flow to no glycol flow to reduce significantly glycol consumption.

Add B1

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